

1/20

FIG. 1

		Nd [wt%]	Pr [wt%]	Dy [wt%]	Co [wt%]	Cu [wt%]	Al [wt%]	B [wt%]	M(Zr,Ti) [wt%]	O ₂ [ppm]	N ₂ [ppm]	Fe	THICKNESS OF ALLOYS
EXAMPLE 1	LOW R ALLOY	23.6	6.0	0.3	—	0.05	0.23	1.1	0~0.22(Zr)	—	—	bal.	250~340 μ m
	HIGH R ALLOY	40.6	—	—	5.0	0.05	0.23	—	—	—	—	bal.	530 μ m
	COMPOSITION OF SINTERED BODY	25.0	5.3	0.3	0.5	0.05	0.23	1.0	0~0.20(Zr)	670	300	bal.	—
COMPARATIVE EXAMPLE 1	LOW R ALLOY	23.6	6.0	0.3	—	0.05	0.23	1.1	0~0.22(Ti)	—	—	bal.	250~340 μ m
	HIGH R ALLOY	40.6	—	—	5.0	0.05	0.23	—	—	—	—	bal.	530 μ m
	COMPOSITION OF SINTERED BODY	25.0	5.3	0.3	0.5	0.05	0.23	1.0	0~0.20(Ti)	780	320	bal.	—
COMPARATIVE EXAMPLE 2	LOW R ALLOY	23.6	6.0	0.3	—	0.05	0.23	1.1	—	—	—	bal.	310 μ m
	HIGH R ALLOY	40.6	—	—	5.0	0.05	0.23	0.5	0~2.0(Zr)	—	—	bal.	470~550 μ m
	COMPOSITION OF SINTERED BODY	25.0	5.3	0.3	0.5	0.05	0.23	1.0	0~0.20(Zr)	920	350	bal.	—
COMPARATIVE EXAMPLE 3	LOW R ALLOY	23.6	6.0	0.3	—	0.05	0.23	1.1	0~0.22(Zr)	—	—	bal.	470~550 μ m
	HIGH R ALLOY	40.6	—	—	5.0	0.05	0.23	—	—	—	—	bal.	530 μ m
	COMPOSITION OF SINTERED BODY	25.0	5.3	0.3	0.5	0.05	0.23	1.0	0~0.20(Zr)	630	290	bal.	—

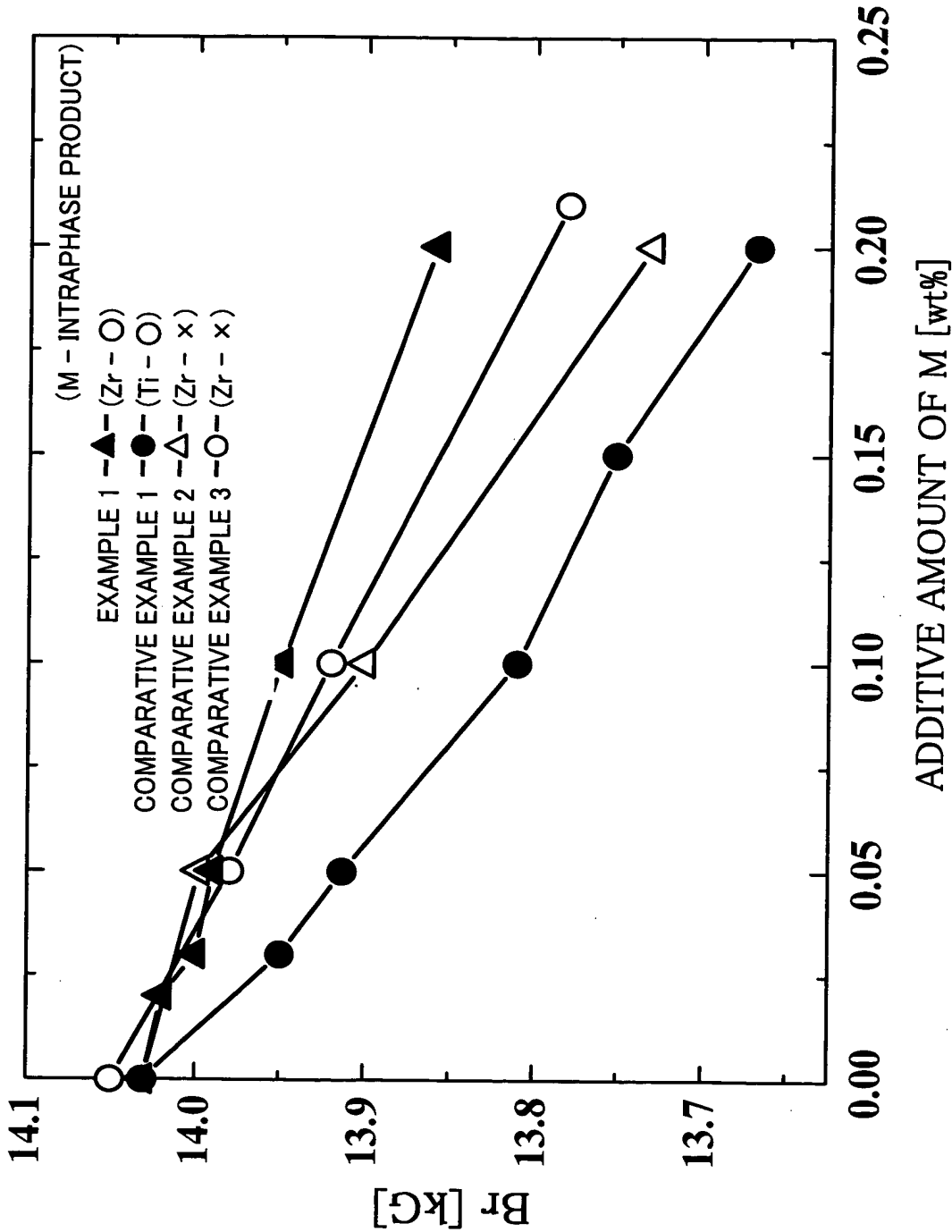
2/20

FIG. 2

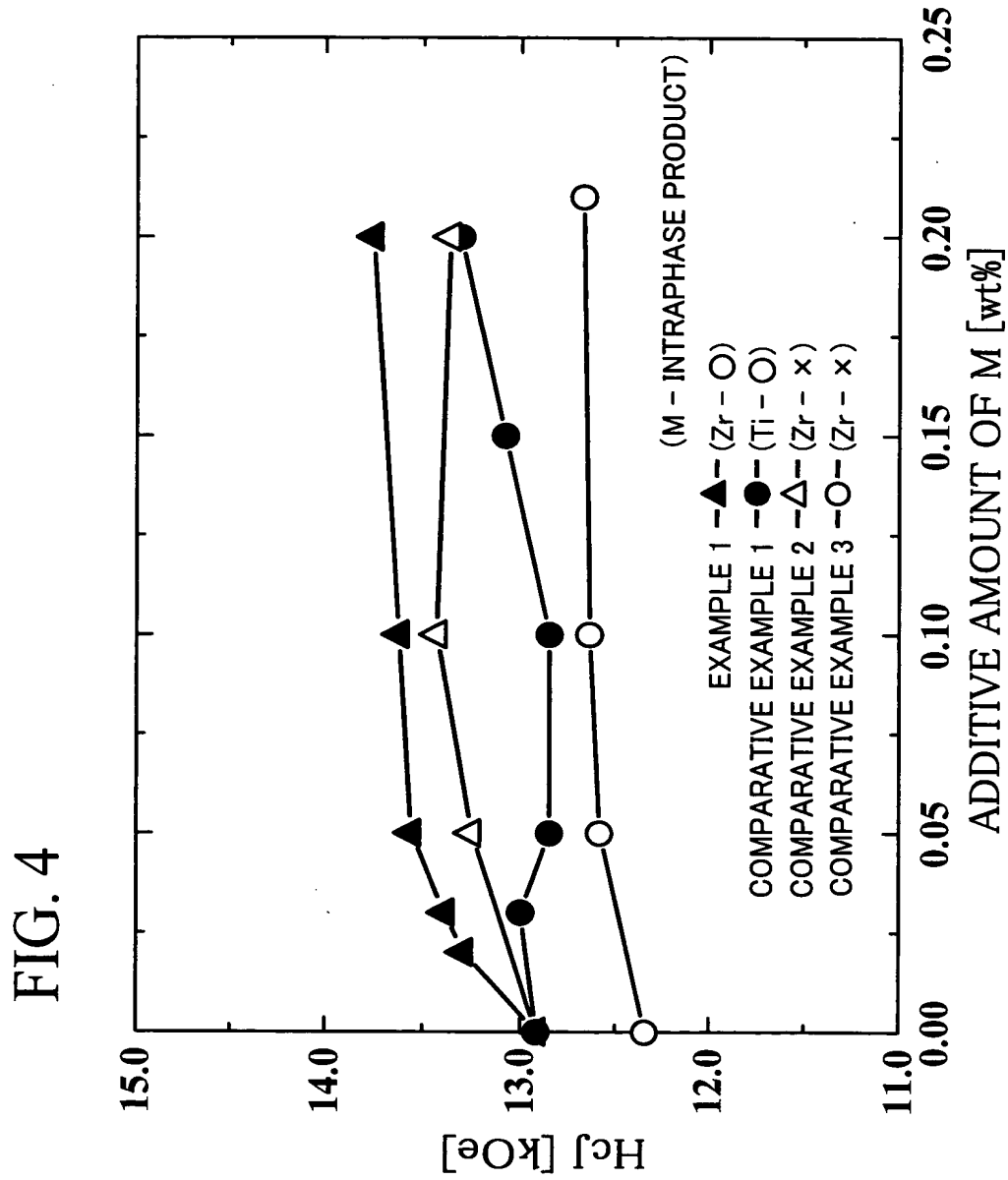
	ADDITIVE ELEMENT M	ADDITIVE AMOUNT OF M [wt%]	PRESENCE OR ABSENCE OF INTRAPHASE PRODUCT	Br [kG]	HcJ [kOe]	Hk/HcJ [%]
REFERENCE EXAMPLE	—	0	×	14.03	12.92	51.7
EXAMPLE 1	Zr	0.02	○	13.94	13.29	81.8
		0.03		13.97	13.39	96.5
		0.05		13.96	13.56	97.5
		0.10		13.95	13.62	96.3
		0.20		13.86	13.75	96.3
COMPARATIVE EXAMPLE 1	Ti	0.03	○	13.95	13.00	85.0
		0.05		13.90	12.85	98.2
		0.10		13.81	12.85	98.2
		0.15		13.75	13.08	97.9
		0.20		13.67	13.31	97.6
COMPARATIVE EXAMPLE 2	Zr	0.05	×	13.99	13.56	63.0
		0.10		13.90	13.43	85.2
		0.20		13.73	13.36	96.6
COMPARATIVE EXAMPLE 3	Zr	0	×	14.05	12.34	53.5
		0.05		13.98	12.58	73.3
		0.10		13.92	12.64	88.3
		0.20		13.78	12.67	96.6

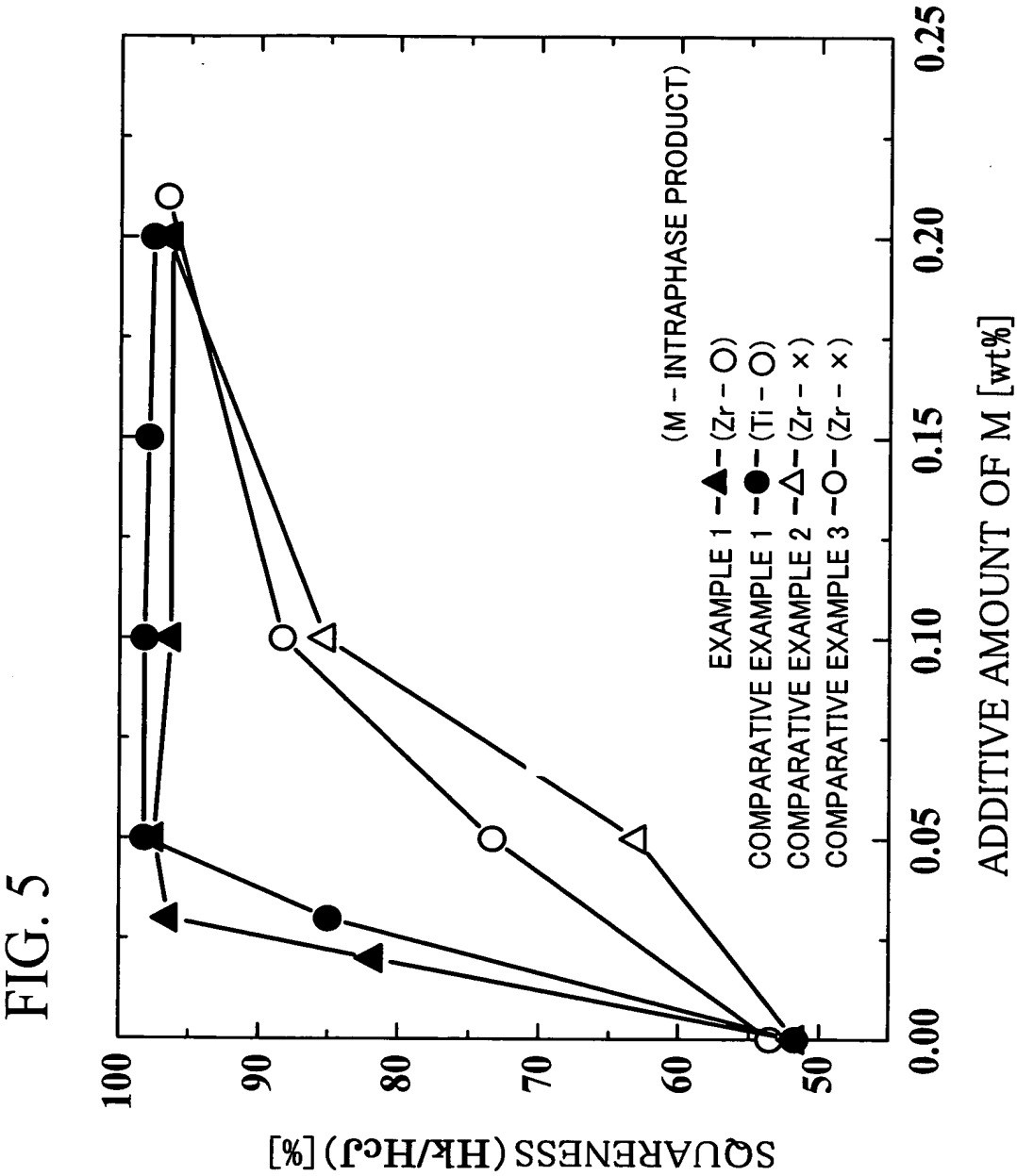
3/20

FIG. 3



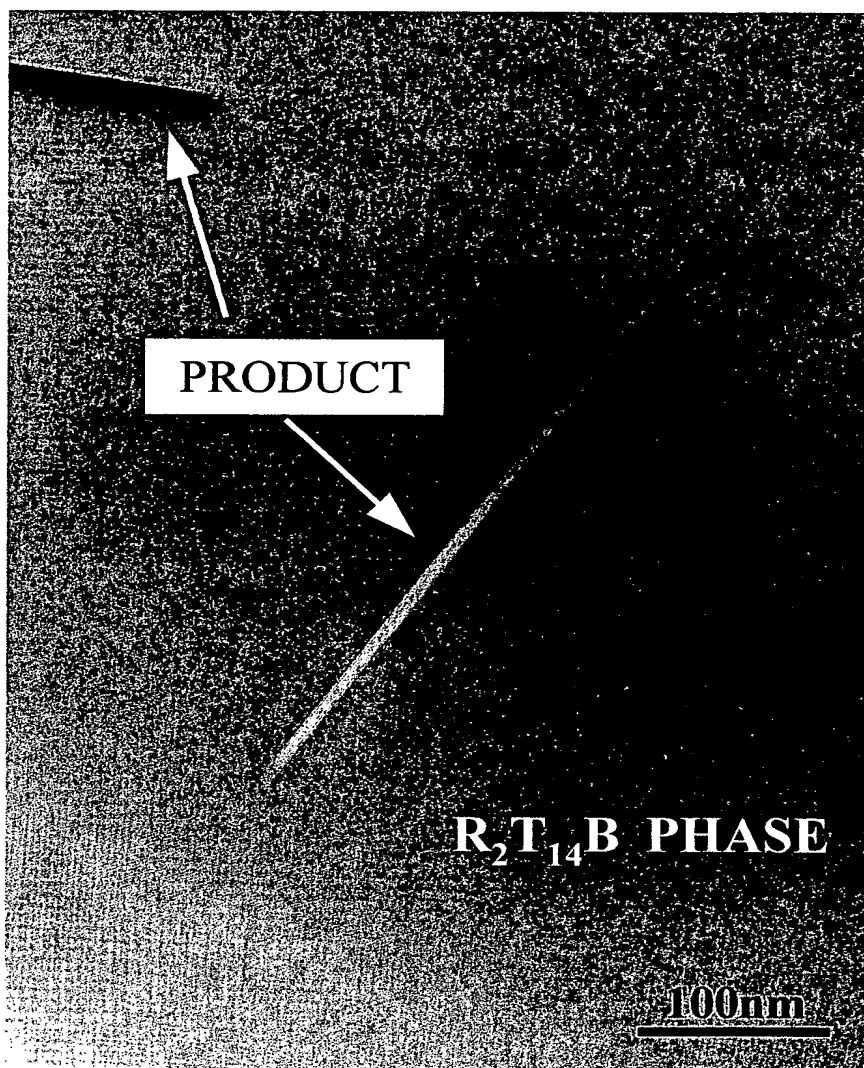
4/20





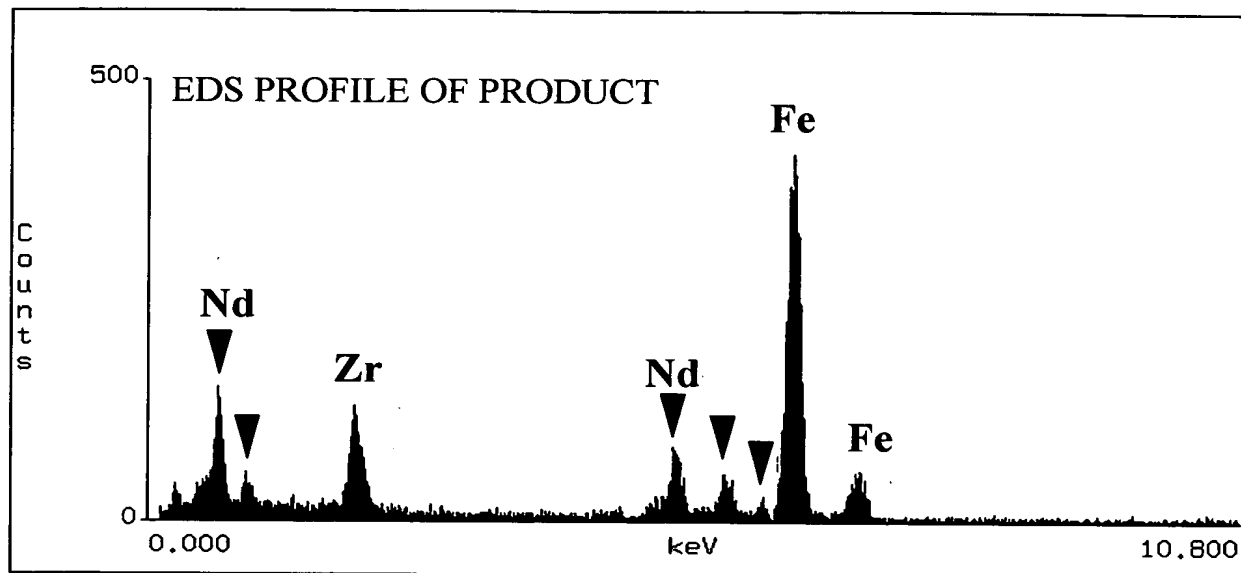
6/20

FIG. 6



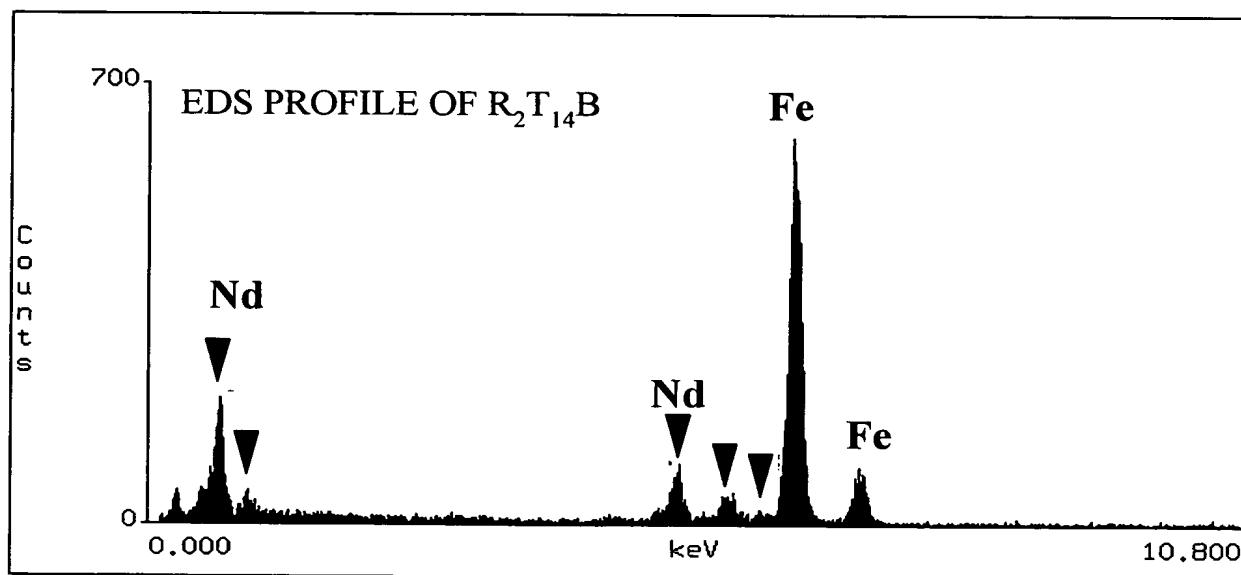
BEST AVAILABLE COPY

FIG. 7A



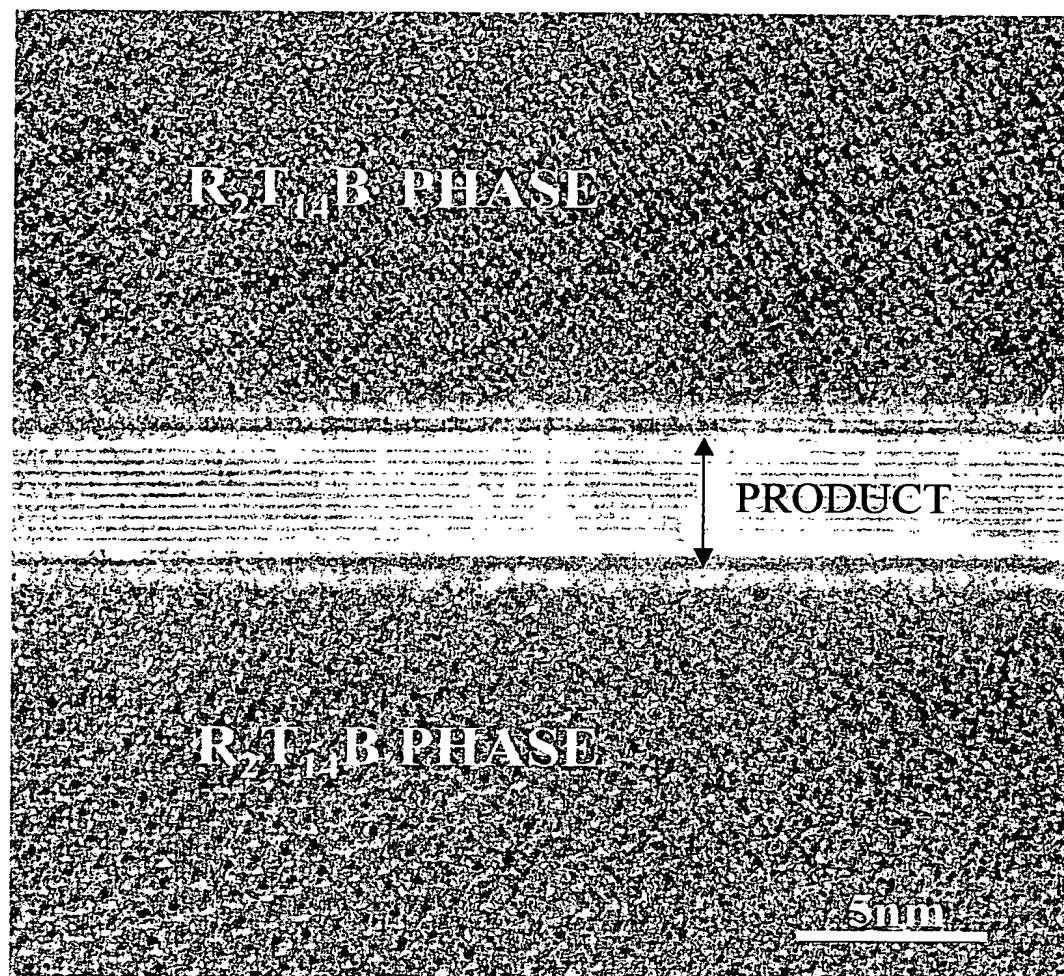
BEST AVAILABLE COPY

FIG. 7B



8/20

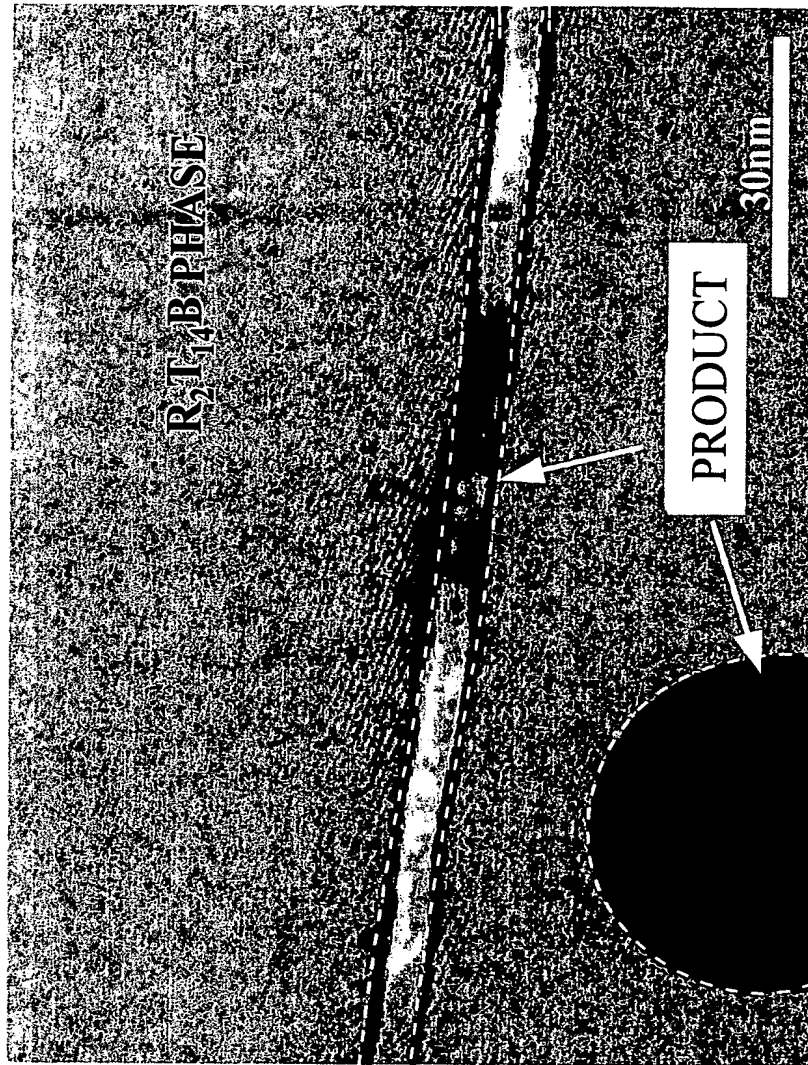
FIG. 8



BEST AVAILABLE COPY

9/20

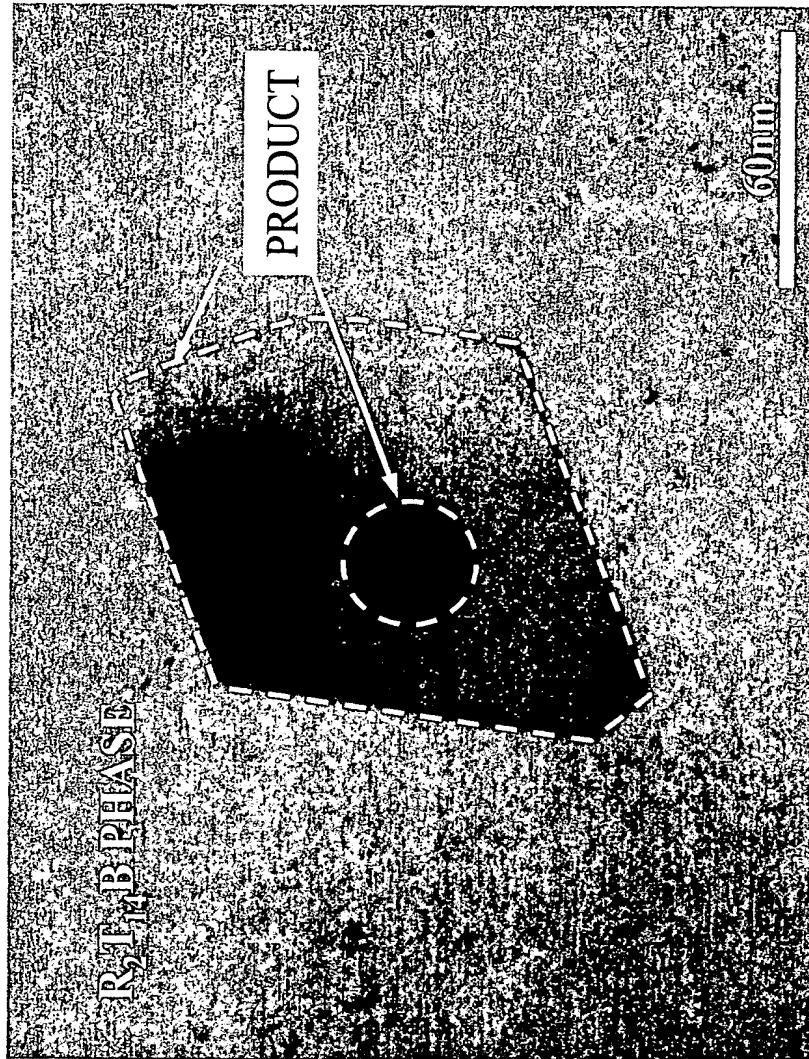
FIG. 9



BEST AVAILABLE COPY

10/20

FIG. 10



BEST AVAILABLE COPY

11/20

FIG. 11A

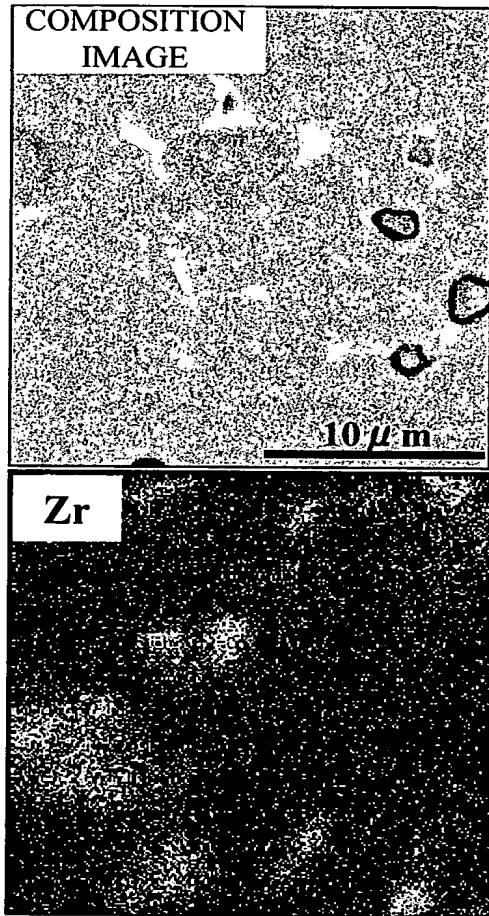
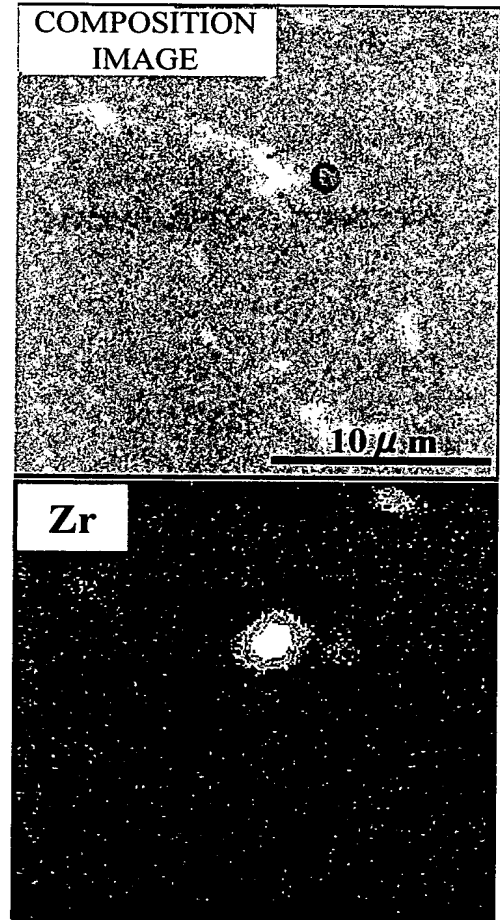


FIG. 11B



BEST AVAILABLE COPY

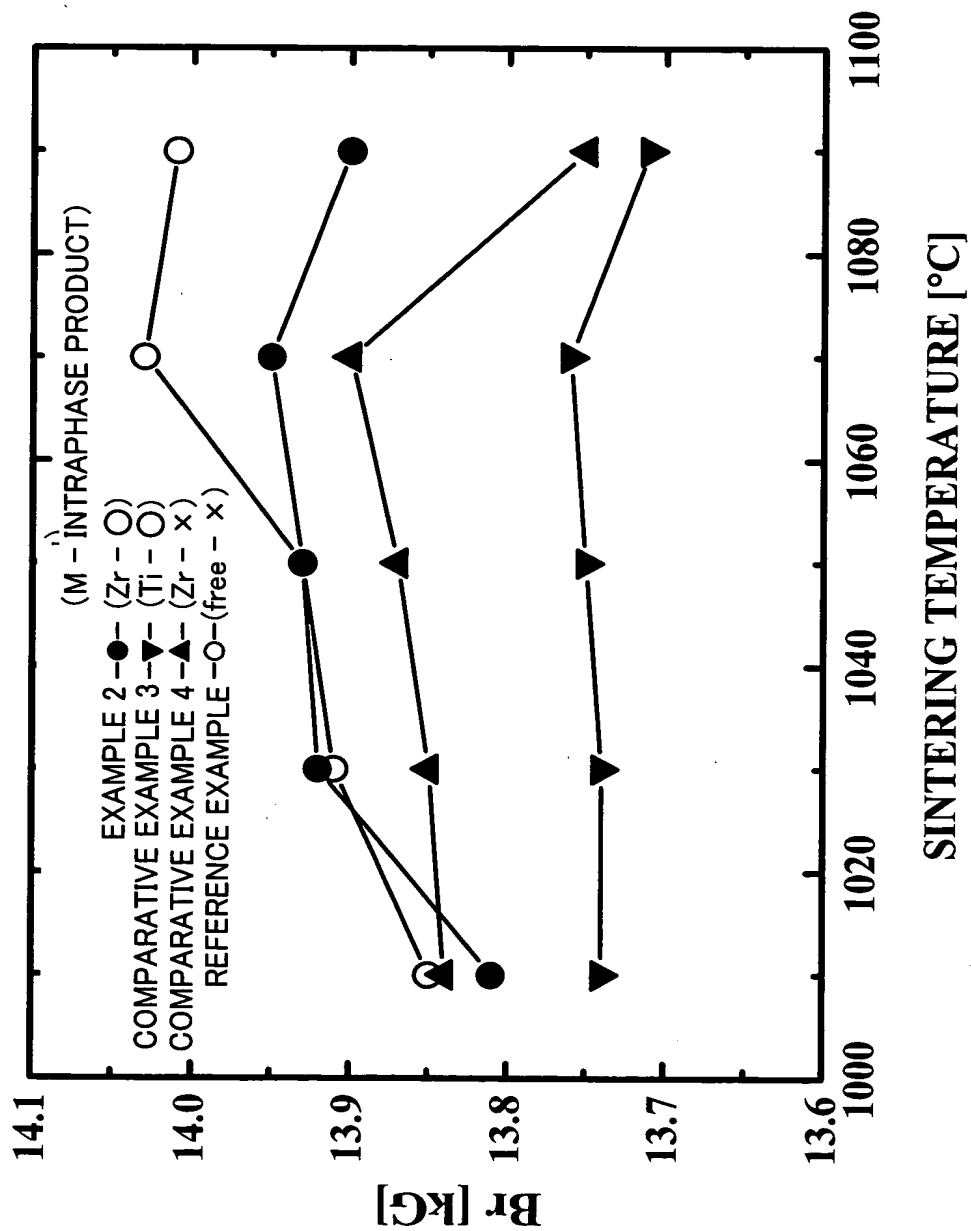
12/20

FIG. 12

	ADDITIVE ELEMENT M	ADDING METHOD OF M	ADDITIVE AMOUNT OF M [wt%]	PRESENCE OR ABSENCE OF INTRAPHASE PRODUCT	SINTERING TEMPERATURE [°C]	Br [kg]	HcJ [kOe]	Hk/HcJ [%]
REFERENCE EXAMPLE	—	—	0	x	1010 1030 1050 1070 1090	13.85 13.91 13.93 14.03 14.01	11.87 12.22 13.25 12.92 12.13	84.2 85.6 88.7 51.7 39.1
EXAMPLE 2	Zr	LOW R ALLOYS	0.1	O	1010 1030 1050 1070 1090	13.81 13.92 13.93 13.95 13.90	12.56 13.26 13.52 13.62 13.42	86.3 96.1 97.0 96.3 96.0
COMPARATIVE EXAMPLE 4	Ti	LOW R ALLOYS	0.1	O	1010 1030 1050 1070 1090	13.74 13.74 13.75 13.76 13.71	12.13 13.05 13.18 13.08 12.68	88.4 95.3 96.2 97.9 91.3
COMPARATIVE EXAMPLE 5	Zr	HIGH R ALLOYS	0.1	x	1010 1030 1050 1070 1090	13.84 13.85 13.87 13.90 13.75	12.24 12.34 13.20 13.18 12.56	86.3 88.7 91.5 90.1 75.3

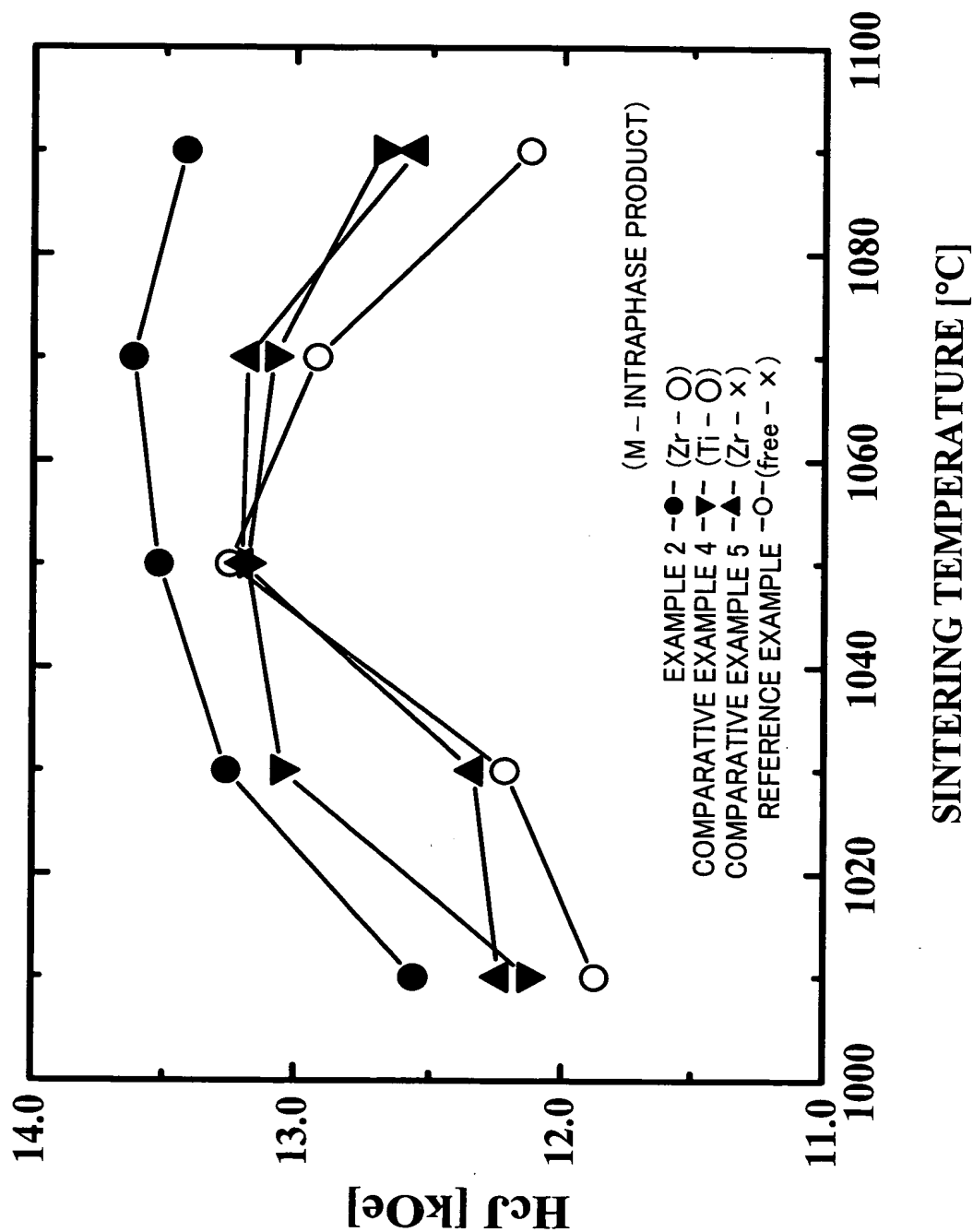
13/20

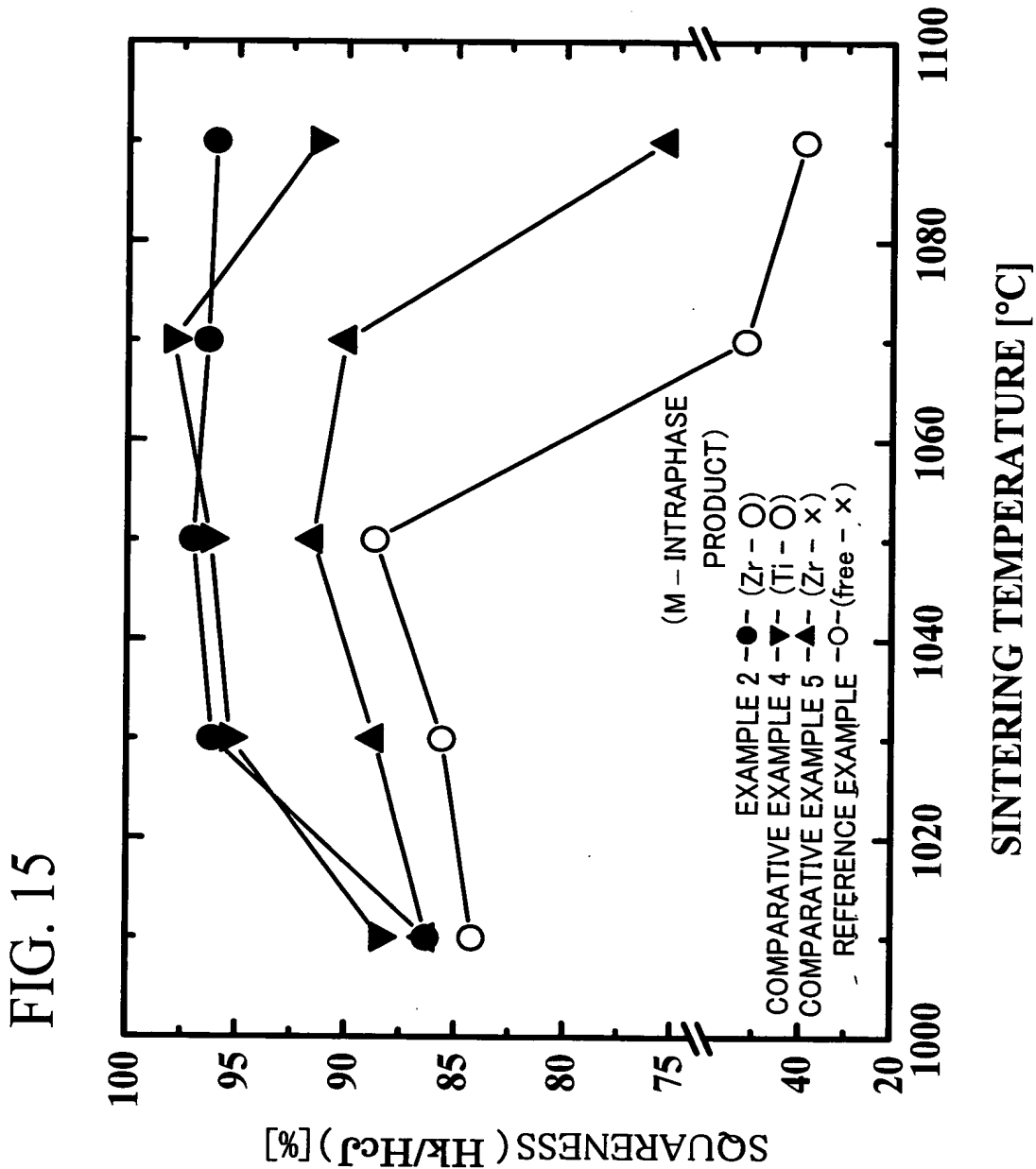
FIG. 13



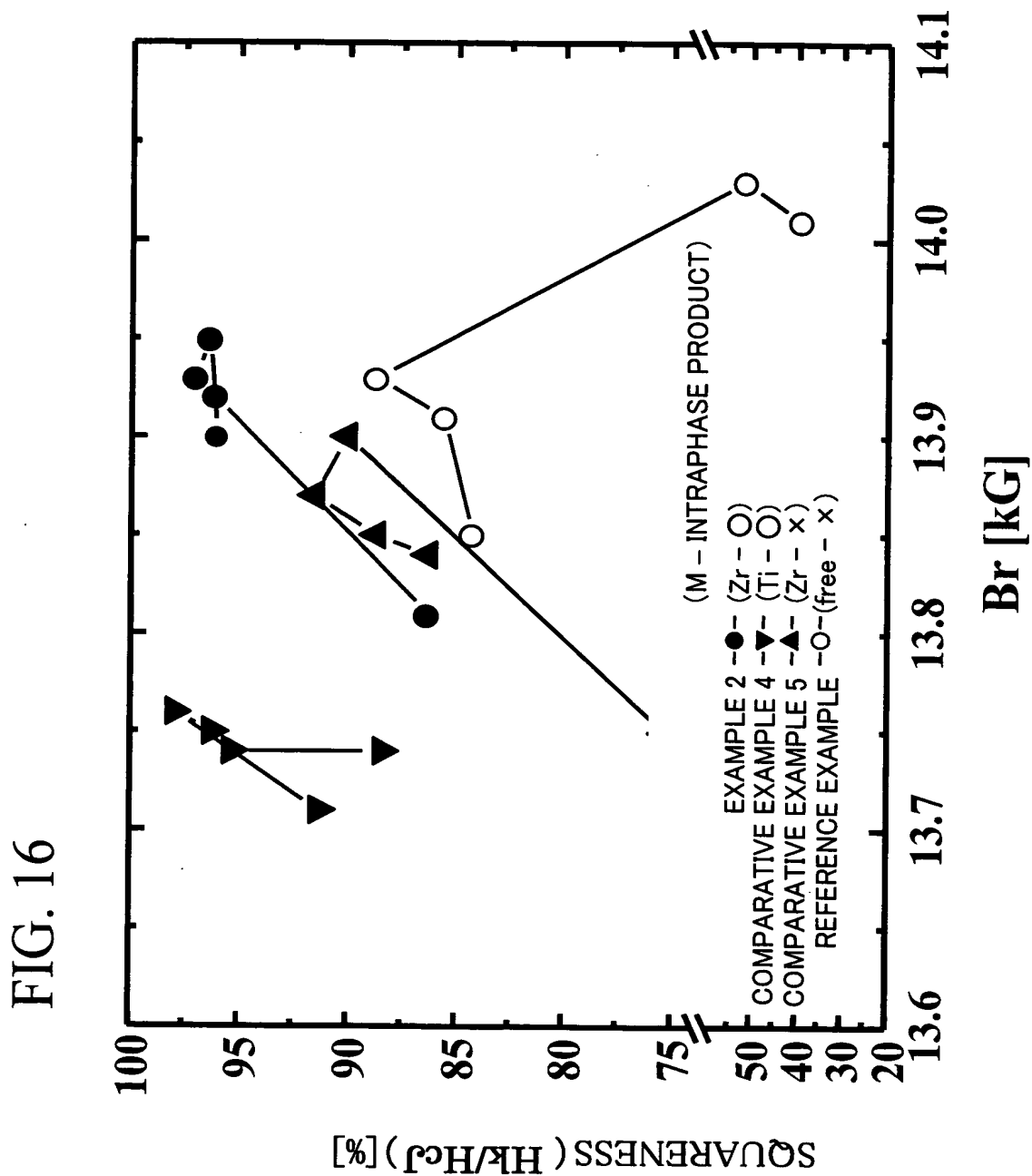
14/20

FIG. 14





16/20



17/20

FIG. 17

		Nd [wt%]	Pr [wt%]	Dy [wt%]	Co [wt%]	Cu [wt%]	Al [wt%]	B [wt%]	Zr [wt%]	O ₂ [ppm]	N ₂ [ppm]	Fe [ppm]	ROLL PERIPHERAL VELOCITY [m/s]	THICKNESS OF ALLOYS [μm]
SAMPLE A	LOW R ALLOY	23.6	6.0	0.3	—	0.05	0.23	1.1	0.09	—	—	bal.	1.0	370
	HIGH R ALLOY	40.6	—	—	5.0	0.05	0.23	—	—	—	—	bal.	0.6	520
	COMPOSITION OF SINTERED BODY	25.0	5.3	0.3	0.5	0.05	0.23	1.0	0.08	980	380	bal.	—	—
SAMPLE B	LOW R ALLOY	23.0	5.7	0.4	—	0.05	0.18	1.1	0.12	—	—	bal.	1.8	240
	HIGH R ALLOY	40.6	—	—	5.0	0.05	0.23	—	—	—	—	bal.	0.6	520
	COMPOSITION OF SINTERED BODY	24.8	5.1	0.4	0.5	0.05	0.19	1.0	0.11	720	440	bal.	—	—
SAMPLE C	LOW R ALLOY	22.5	6.2	0.4	—	0.05	0.23	1.1	0.20	—	—	bal.	1.6	270
	HIGH R ALLOY	40.6	—	—	5.0	0.05	0.23	—	—	—	—	bal.	0.6	520
	COMPOSITION OF SINTERED BODY	24.3	5.6	0.4	0.5	0.05	0.23	1.0	0.18	870	420	bal.	—	—
SAMPLE D	LOW R ALLOY	22.7	5.9	1.3	—	0.05	0.23	1.1	0.20	—	—	bal.	1.5	320
	HIGH R ALLOY	30.3	—	10.0	5.0	0.05	0.15	—	—	—	—	bal.	0.6	550
	COMPOSITION OF SINTERED BODY	23.5	5.3	2.2	0.5	0.05	0.22	1.0	0.18	680	390	bal.	—	—

18/20

FIG. 18

	SINTERING TEMPERATURE [°C]	Br [kG]	H _c J [kOe]	H _k /H _c J [%]
SAMPLE A	1010	14.05	11.13	88.6
	1030	14.06	14.61	95.0
	1050	14.14	14.61	97.0
	1070	14.14	13.45	95.2
	1090	14.22	4.26	44.0
SAMPLE B	1010	14.03	11.85	88.0
	1030	14.10	14.67	95.6
	1050	14.13	14.71	96.4
	1070	14.15	14.35	97.5
	1090	14.08	13.52	96.0
SAMPLE C	1010	13.98	12.81	87.3
	1030	14.07	14.67	95.3
	1050	14.08	14.72	96.1
	1070	14.08	14.70	98.2
	1090	14.08	14.61	97.9
SAMPLE D	1010	13.90	14.31	95.6
	1030	13.90	16.07	97.8
	1050	13.90	16.18	97.9
	1070	13.91	16.22	97.8
	1090	13.92	15.83	72.1

19/20

FIG. 19

		Nd [wt%]	Pr [wt%]	Dy [wt%]	Co [wt%]	Cu [wt%]	Al [wt%]	B [wt%]	Zr [wt%]	O ₂ [ppm]	N ₂ [ppm]	Fe
SAMPLE E	LOW R ALLOY	27.9	—	0.1	—	0.03	0.05	1.1	0.08	—	—	bal.
	HIGH R ALLOY	35.1	—	—	2.0	0.03	0.05	—	—	—	—	bal.
	COMPOSITION OF SINTERED BODY	28.3	—	0.1	0.2	0.03	0.05	1.0	0.07	720	360	bal.
SAMPLE F	LOW R ALLOY	23.7	6.0	0.2	—	0.30	0.25	1.6	0.30	—	—	bal.
	HIGH R ALLOY	40.6	—	—	20.0	0.30	0.25	—	—	—	—	bal.
	COMPOSITION OF SINTERED BODY	26.9	4.8	0.2	4.0	0.30	0.25	1.3	0.24	980	450	bal.

20/20

FIG. 20

	Br [kG]	HcJ [kOe]	Hk/HcJ [%]
SAMPLE E	14.62	13.10	98.0
SAMPLE F	13.88	15.30	96.0
SAMPLE A	14.14	13.45	95.2
SAMPLE B	14.15	14.35	97.5
SAMPLE C	14.08	14.70	98.2
SAMPLE D	13.91	16.22	97.8